dynamic instrumentation Σ

STK # 31026

ENDEVCO

801 SOUTH ARROYO PARKWAY, PASADENA, CALIF.

CORPORATION

INSTRUCTIONS FOR 2614B LABORATORY AMPLIFIER

MODEL 2614B AMPLIFIER INSTRUCTION MANUAL

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INSTRUCTION MANUAL FOR MODEL 2614B AMPLIFIER

1.0 INTRODUCTION

The Endevco Model 2614B Amplifier provides amplification for piezoelectric accelerometers, force gages, and pressure pickups. The very high input resistance assures adequate low frequency response. Standardization of the output signal is accomplished by means of variable shunt capacity across the input. Gains of 1, 3, or 10 are available.

The Model 2614B can be used with either capacitive or resistive devices. (With resistive devices the input selector must be set at position 2 or 3).

2.0 CONTROLS AND CONNECTORS

2.1 Gain Switch

The gain switch is on the outside of the top cover. Changes in gain are accomplished by setting the selector switch to gains of 1, 3, or 10.

2.2 Input Selector Switch (under removable cover)

The Input Selector Switch is located next to the three decade standardizer switches. Unless there is a very special situation, this should be left in Position 2.

Position 1 provides 1000 megohms input impedance with no capacitive coupling or DC isolation.

Position 2 provides 1000 megohms input impedance with 0.02 μf coupling capacity for applications where DC isolation is required. This position is recommended for use with all piezoelectric and capacitive type of pickups.

Position 3 provides 22 megohms input impedance with 0.02 μf coupling. This position shortens the time constant of the amplifier to provide fast recovery time from overload and also limits low frequency response. Because it is below 100 megohms it is not generally recommended for crystal pickups.

2.3 Output Standardizer (under removable cover)

The Endevco Model 2614B Output Standardizer includes a three-decade step capacitor adjustment that allows discrete capacities to be added in shunt across any accelerometer in 10 pf steps up to 10,000 pf. These decade capacitors make it possible to standardize the sensitivity of any accelerometer to any value E less than its original calibration E_c such as 10 rms millivolts

per g so that g instead of millivolts can be read directly from the scale of a vacuum tube voltmeter without interpolation. In other instances where very high g levels are expected, it may be necessary to reduce the sensitivity of the accelerometer by a factor of 10 or more in order not to exceed the 5 volt maximum output of the amplifier. To arrive at the exact capacity to be added to an accelerometer for a desired value of E, use the following equation:

$$C_t = \frac{E_c}{E} (C_p + C_{cal}) - C_p$$

Where: E_c is factory supplied calibration sensitivity (calibrated with a stated external capacitance loading)

C_{cal} is external capacitance used during calibration

C_p is internal capacity of accelerometer

E is actual sensitivity for any total external capacitive loading of C_t on the accelerometer

C_t is total externally applied capacitance (including cable) in pf

Example:

C_{cal} = 100 pf

E_c = 15.6 pk mv/pk g

C_p = 539

Desired E = 10 pk mv/pk g

$$C_t = \frac{15.6}{10} \times (539 + 100) - 539$$

C_t = 458 pf

Let us assume that you have 90 pf in three feet of cable plus amplifier residual capacity (25 pf) between the accelerometer and amplifier. When you subtract these values from the required total obtained in the computation, you obtain 343 pf as the amount to be set into the decade capacity switch.

Note: See Series 2200 Manual for further information concerning transducer sensitivity calculations and frequency response.

IMPORTANT: The residual input capacity of these amplifiers is approximately 25 pf and must be added to cable capacities in all calculations.

The above procedure can be followed to standardize any piezoelectric pickup to any desired value, and it makes possible the standardizing of all accelerometers in any laboratory to one value for rapid analysis of test data. For the greatest

accuracy, it is recommended that the capacity switch should be set while the accelerometers are operating at some known g value so that the capacity switch can be adjusted until the exact sensitivity desired is reached, this may differ slightly from the theoretical calculations above due to small non-linearities possible, particularly in the low capacity regions.

2.4 Connectors

The input connector is Endevco part EJ3 (Microdot 51-79). It mates with Endevco part EP11 (Microdot 52-173) or EP47 which is a right-angle connector. The input connector mates with all Endevco accelerometer cable assemblies (3030 or 3090).

The output connector is a Cannon WK-6-32S. This mates with Endevco part EP9 (Cannon WK-6-21C-1/4). This connector is furnished with the amplifier when purchased alone. When purchased with an Endevco power supply, an interconnecting five foot cable is provided (Endevco part 2920-14). This connector also provides the power input for the amplifier.

3.0 MOUNTING

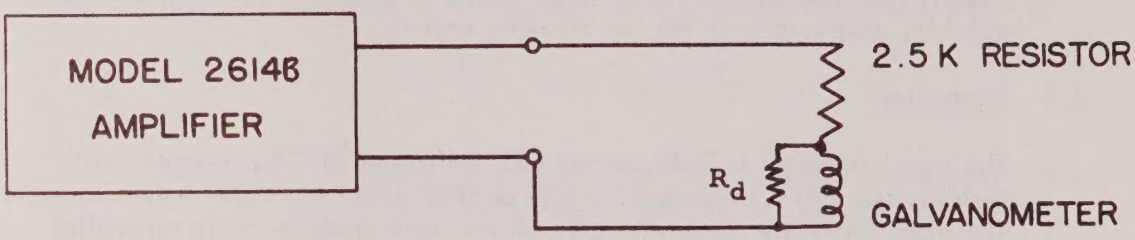
The small size of the Model 2614B makes it easy to locate near the accelerometer. It is usually placed on a convenient table. For permanent mounting there are four mounting holes in the bottom. These are 1/4 inch deep 4-40 NC-2B. In some situations it may be advisable to mount the amplifier so that it is electrically insulated from ground to minimize ground loop noise pickup.

4.0 ENVIRONMENT

The Model 2614B is designed for a laboratory environment. Particular care should be taken to keep the amplifier from moisture condensation from very humid atmospheres. Moisture can significantly reduce the input resistance and thereby the low frequency response.

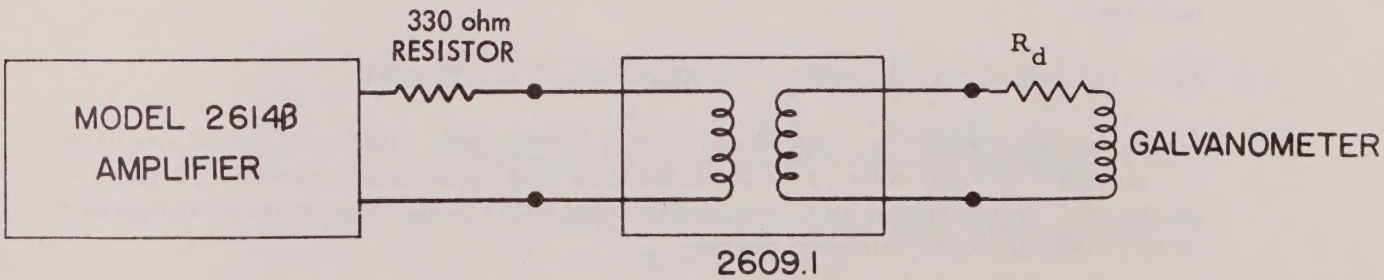
5.0 HIGH FREQUENCY GALVANOMETER RECORDING ACCESSORY

For Model 2614B Amplifier - the Model 2609.1 Transformer. The Model 2614B Amplifier can provide 7 (0 - pk) volts into a 2500 ohm load which gives approximately 5.6 ma pk - pk current. This is enough to drive galvanometers with natural frequencies up to approximately 1000 cps in the following manner:



R_d = recommended damping resistor for galvanometer

The highest frequency galvanometers (up to 5000 cps natural frequency) are not sensitive enough when in series with 2500 ohms to be driven directly by the Model 2614B. When driven through the Model 2609.1 Transformer, however, full power (approximately 50 ma pk-pk) can be provided to a 28 ohm load or galvanometer for large displacement recording at high frequencies.



6.0 CIRCUIT DESCRIPTION

The signal goes into a decade capacity switch before it enters the amplifier section. This adjustable capacity is in shunt across the signal input.

The signal then passes into the grid of the pentode V1. From there it passes through a network for low frequency compensation and into the grid of the triode V2. A Zener diode provides a fixed bias on this second stage. Negative feedback is taken from V2 back to V1. The amount of negative feedback to reach V1 is controlled by series resistances which are selected by the amplifier gain switch. A blocking capacitor C2 is in the feedback loop, and the signal is taken off just beyond C2. The signal then passes through the output blocking capacitor to the signal output connector.

7.0 MAINTENANCE AND TROUBLE SHOOTING

Very little maintenance is required. Connections should be checked for loose connections, grounds, and shorts.

Occasional checks of the input resistance and the gain should be made. These tests are described in the accompanying "Test Procedures". Low input resistance may be due to moisture which can be removed by exposure of the amplifier to a warm, dry atmosphere.

If serious trouble occurs, the amplifier should be returned to the factory for repair. It should be accompanied by a description of the particular fault and the situation in which it occurred. See the warranty section at the front of this manual for instructions pertaining to the return of an amplifier covered by the Endevco warranty.

ENDEVCO CORPORATION
Pasadena, California

INSTRUCTION MANUAL MODEL 2614B AMPLIFIER

	ENDEVCO PART NO.	PART	VALUE	MANUFACTURER	MFR.PART
V1	EV10	TUBE		GENERAL ELECTRIC	#5654
V2	EV5	TUBE		GENERAL ELECTRIC	#6T4
J1	EJ3	CONNECTOR		MICRODOT	#5179
J2	EJ9	RECEPTACLE		CANNON	#WK-6-32 S
		DECADE SWITCH ASSEMBLY			
C1	EC11	CAPACITOR	10pf ± 5% 300WVdc	ELMENCO	#DM15
C2	EC12	"	20pf ± 0.5pf 300WVdc	"	#DM15
C3	EC13	"	70pf ± 1% 300WVdc	"	#DM15
C4	EC14	"	40pf ± 0.5pf 300WVdc	"	#DM15
C5	EC15	"	100pf ± 1% 300WVdc	"	#DM15
C6	EC16	"	200pf ± 1% 300WVdc	"	#DM15
C7	EC18	"	700pf ± 1% 300WVdc	"	#DM15
C8	EC17	"	400pf ± 1% 300WVdc	"	#DM15
C9	EC19	"	1000pf ± 1% 300WVdc	"	#DM15
C10	EC20	"	2000pf ± 1% 300WVdc	"	#DM15
C11	EC21	"	3000pf ± 1% 300WVdc	"	#DM15
C12	EC22	"	4000pf ± 1% 300WVdc	"	#DM15
C13	EC22	"	4000pf ± 1% 300WVdc	"	#DM15
C14	EC23	"	.02µf ± 20% 500V	ELECTRA	#16x20 3MA5
R1	ER21	RESISTOR	22M Ω ± 10% 1/2 W	ALLEN BRADLEY	Type EB
R2	ER13	"	1000M Ω ± 30% 1/2 W	I.R.C. SPECIAL	
		AMPLIFIER CIRCUIT ASSEMBLY			
C1	EC32	CAPACITOR	12µf ± +100% -10% 150V	ASTRON #ET or SPRAGUE #TE1508	
C2	EC103	"	27µf +20% -15% 100V	SPRAGUE	109D276C2100T2
C3	EC23	"	.02µf ± 20% 500V	ELECTRA	#16x203 MA5
C4	EC94	"	300µf +100% -10% 6V	SPRAGUE	#TE1106
C5	EC95	"	.25µf ± 20% 200V	HOPKINS ENG.CO.	#P252D
R1	ER5	RESISTOR	1M Ω ± 10% 1/2 W	ALLEN BRADLEY	Type EB
R2	ER2	"	330KΩ ± 10% 1/2 W	" "	Type EB

	ENDEVCO PART NO.	PART	VALUE	MANUFACTURER	MFR. PART
R3*	ER23	RESISTOR	1K Ω ± 5% 1/2 W	ALLEN BRADLEY	Type EB
"	ER56	"	820 Ω ± 5% 1/2 W	" "	Type EB
"	ER57	"	910 Ω ± 5% 1/2 W	" "	Type EB
"	ER58	"	1.1K Ω ± 5% 1/2 W	" "	Type EB
"	ER59	"	1.2K Ω ± 5% 1/2 W	" "	Type EB
"	ER60	"	1.3K Ω ± 5% 1/2 W	" "	Type EB
"	ER94	"	1.5K Ω ± 5% 1/2 W	" "	Type EB
R4	ER24	RESISTOR	18K Ω ± 1/2% 1/2 W	R.P.C. TYPE LAC	
R5	ER25	"	6.2K Ω ± 1/2% 1/2 W	" " "	
R6	ER26	"	2.6K Ω ± 1/2% 1/2 W	" " "	
R7	ER230	"	2.2M Ω ± 5% 1/2 W	ALLEN BRADLEY	Type EB
R8	ER27	"	12K Ω ± 10% 1 W	" "	Type GB
R9	ER27	"	12K Ω ± 10% 1 W	" "	Type GB
R10	ER28	"	22K Ω ± 10% 1/2 W	" "	Type EB
R11	ER4	"	10M Ω ± 10% 1/2 W	" "	Type EB
CR1	ECR23	DIODE	ZENER IN702 2.2V ± 10%	HOFFMAN	or HUGHES

* NOMINAL VALUE. For optimum performance, select from this list of R3 Resistors

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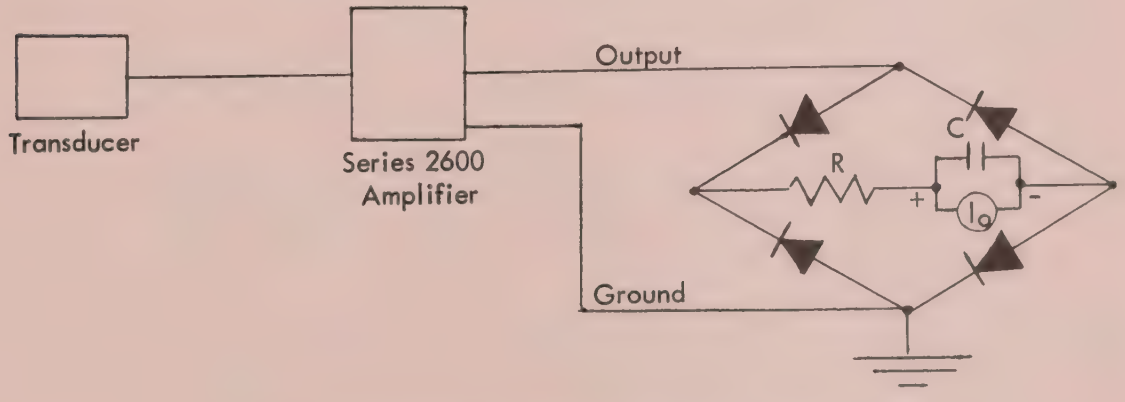
TECH-DATA NO. TD 505	
AFFECTS 2600 Series Amplifiers	
CLASSIFICATION	G
REVISION DATE: 7/61	
ORIGINATOR PLL	

RECTIFIED AMPLIFIER OUTPUT PROVIDES DC MONITOR OF VIBRATION LEVEL

The output from Endevco AC amplifiers can be rectified to provide a DC output proportional to the level of sinusoidal acceleration, pressure or force being measured. This output can then be monitored by slow-response meters or recorders. Typical circuit is shown below:



R = Minimum Load Impedance Specified for Amplifier

C = Filter Capacitor, 2 μf Minimum

I_o = Meter with Movement Adequate for Maximum (r.m.s.) Current Output of Amplifier, or Galvanometer

The diode forward resistance should be small compared with R.

The diode reverse resistance should be large compared with R.

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REPRESENTATIVES: AUSTRIA · AUSTRALIA · BELGIUM · CANADA · FRANCE · GERMANY · ITALY · INDIA · JAPAN · S. AFRICA · SWEDEN · SWITZERLAND

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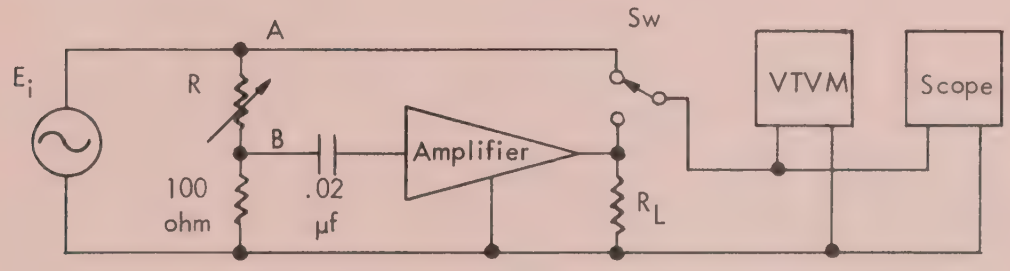
TECH-DATA NO. 517	
AFFECTS 2600 Voltage Amplifiers	
CLASSIFICATION	G
REVISION DATE: 5/11/63	
ORIGINATOR B. Epstein	

TEST PROCEDURES FOR 2600 VOLTAGE AMPLIFIERS

1.0 AMPLIFIER GAIN



1.1 R should be a continuously variable precision resistor with a calibrated dial. The 100 ohm resistor should have an accuracy of 0.1% or better. The two resistors may be replaced with a precision inductive voltage divider.

1.2 Apply a voltage E_i (5 V RMS at 1000 cps) and adjust the divider setting, so that the output from the amplifier is equal to the voltage at point A. Insure that the voltages are the same by switching Sw, repeatedly.

1.3 The Amplifier Gain, G, is equal numerically to the following when the voltages are equal:

$$G = \frac{R + 100}{100}$$

where R is the value of the variable resistor.

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1.4 Should the amplifier gain be less than 1.000, interchange the leads at A and B, and repeat 1.2. The amplifier gain in this case is given by:

$$G = \frac{100}{R + 100}$$

1.5 Caution: Check signal waveshape to see that noise and distortion are not excessive. Always use a .02 μf or larger coupling to input of amplifier.

1.6 If a precision voltage divider is not available, connect leads at points A and B, together. The Amplifier gain is then the ratio of output to input.

$$G = \frac{\text{Output}}{\text{Input}}$$

This method is relatively inaccurate and may be used when only a rough value of gain need be known.

2.0 FREQUENCY RESPONSE

2.1 The equipment and connections for this test are the same as for Amplifier Gain.

2.2 Apply a voltage E_i (5 V RMS at a reference frequency of 1000 cps) and adjust the divider setting so that the output of the amplifier is equal to the voltage at point A. Insure that the voltages are the same by switching Sw, repeatedly.

2.3 Vary the frequency over the specified range, keeping the input signal, at point A, at constant amplitude. At each frequency adjust the setting of the voltage divider network so that the output of the amplifier is equal to the voltage at point A.

$$\% \text{ Gain Variation} = 100\ \frac{G_f - G_{1000}}{G_{1000}} = 100\ \frac{R_f - R_{1000}}{R_{1000} + 100}$$

where R_{1000} is the value of the variable resistor at 1000 cps

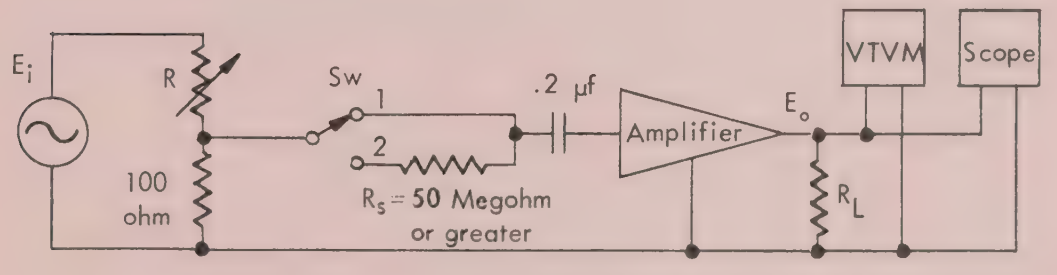
and R_f is the value of the variable resistor at any other frequency.

2.4 Should the amplifier gain be less than 1.000, interchange leads A and B, and repeat 2.2 and 2.3. The % gain variation in this case is:

$$\% \text{ Gain Variation} = 100 \left(\frac{R_{1000} - R_f}{R_f + 100} \right)$$

2.5 Caution: Check the signal waveshape to see that noise and distortion are not excessive.

3.0 INPUT RESISTANCE

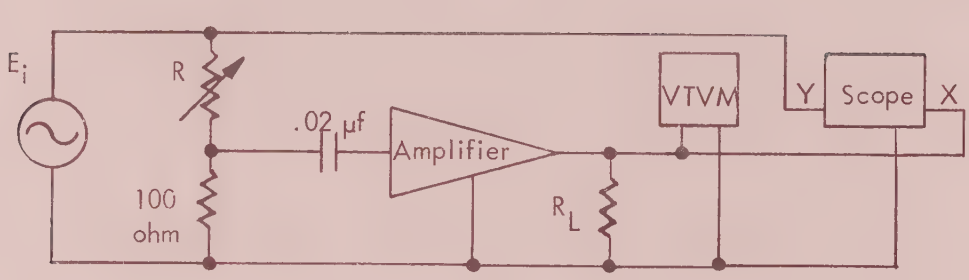


3.1 With switch in position 1, apply a voltage E_i at 5 cycles such that the amplifier output voltage E_{01} is at rated value. With switch in position 2, read amplifier output, E_{02}. The input resistance of the amplifier, R_A, is:

$$R_A = R_S \left(\frac{E_{02}}{E_{01} - E_{02}} \right)$$

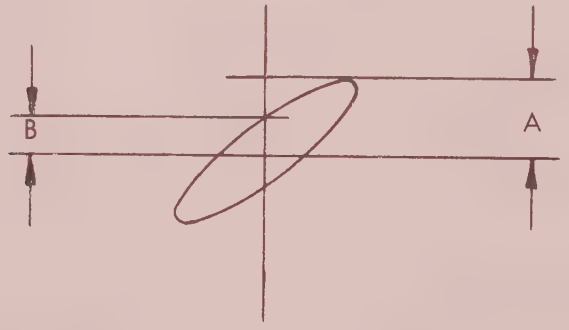
3.2 Caution: Check output signal waveshape for excessive noise pickup.

4.0 PHASE SHIFT



4.1 Adjust the voltage E_i (at a reference frequency, usually 1000 cps) so that the output of the amplifier is at a convenient voltage.

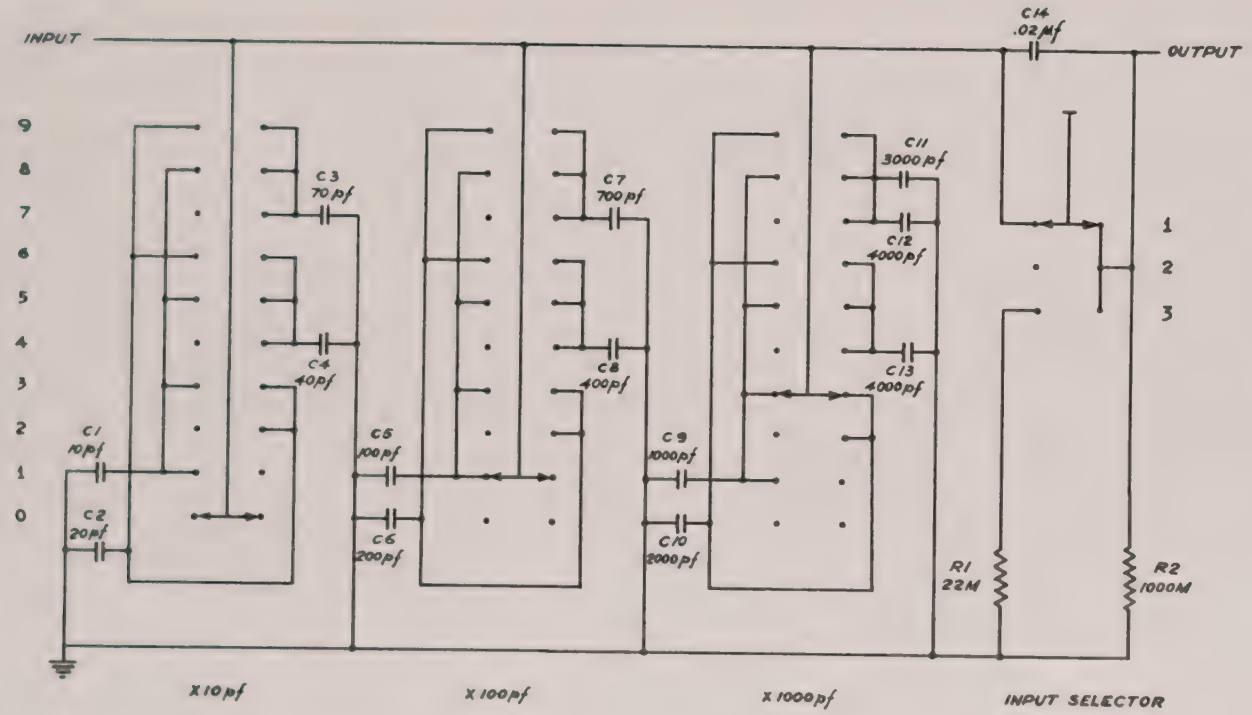
4.2 Vary the frequency through the specified range. Center the ellipse with respect to the oscilloscope graticle. Measure A and B as shown:



4.3 The phase angle, θ, at each frequency is determined from the Lissajous figure using the relationship: $\sin \theta = \pm \frac{B}{A}$. The minus sign is used when the ellipse tilts in the other direction.

4.4 Caution: Check signal waveshape to see that noise and distortion are not excessive.

CHG	CHANGE DESCRIPTION	BY DATE	CHK	APPR



C-2614B-501.IC 2

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PASADENA CALIFORNIA

	SPECIFICATIONS UNLESS OTHERWISE NOTED		
	LIMITS OF DIMS.	1. BREAK ALL SHARP CORNERS .005 MAX. 2. SURFACE ROUGHNESS 63 MICROINCH RMS MAX. 3. DIAMETERS TO BE CONCENTRIC WITHIN .005 T.I.R. 4. FILLET RADIUS .010 MAX. 5. THREADS CLASS 2	
	ANGULAR ± —		
	FRACTIONAL ± —		
	DECIMAL ± —	SCALE: ———	DO NOT SCALE DRAWING
	MATERIAL: ———		DRAWN BY GHL 7-2
	FINISH ———		CHKD BY [illegible]
			PROJ. ENG.
2614B	PART NAME: SCHEMATIC DECADE SWITCH		C-2614B-[illegible] CHG
NEXT ASSEMBLY			

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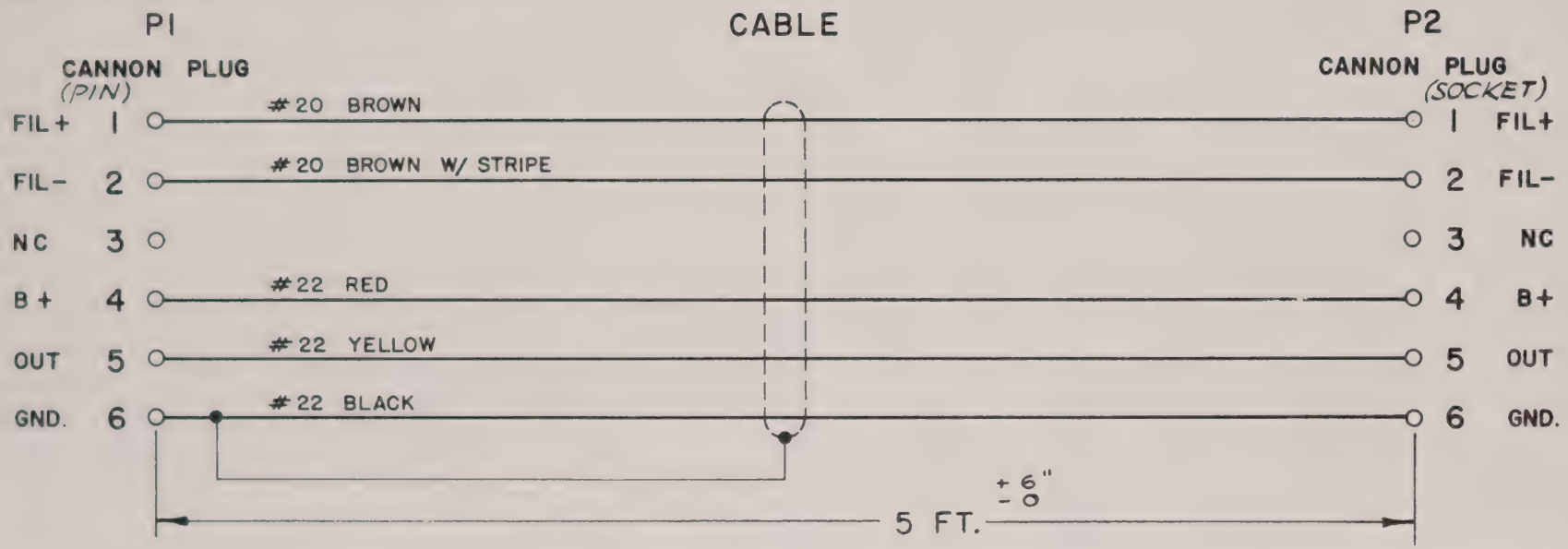
Item	Part No	Description	Quan
P1	EP2	PLUG, CANNON RWK-6-22C-1/4	1
P2	EP9	PLUG, CANNON WK-6-21C-1/4	1
	EW26	CABLE, SURPRENANT # 3247 x 5'	1

A 2920-14C | 4



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CHG	CHANGE DESCRIPTION	BY DATE	CHK	APPR
4	ADDED SOCKET-PIN DESIG. & T'L.	2/2/60	[illegible]	RCC
3	[illegible]	[illegible]	[illegible]	[illegible]

NEXT ASSEMBLY

SPECIFICATIONS UNLESS OTHERWISE NOTED

LIMITS OF DIMS.

ANGULAR ± —

FRACTIONAL ± —

DECIMAL ± —

1. BREAK ALL SHARP CORNERS .005 MAX.
2. SURFACE ROUGHNESS 63 MICROINCH RMS MAX.
3. DIAMETERS TO BE CONCENTRIC WITHIN .005 T.I.R.
4. FILLET RADIUS .010 MAX. 5. THREADS CLASS 2

SCALE: —

DO NOT SCALE DRAWING

MATERIAL: —

DRAWN BY: BRB 5-6-58

FINISH: —

CHKD BY: [illegible] 5-6-58

PROJ. ENG: [illegible] 5-6-58

PART NAME: POWER CABLE

A-2920-14C | CHG 4

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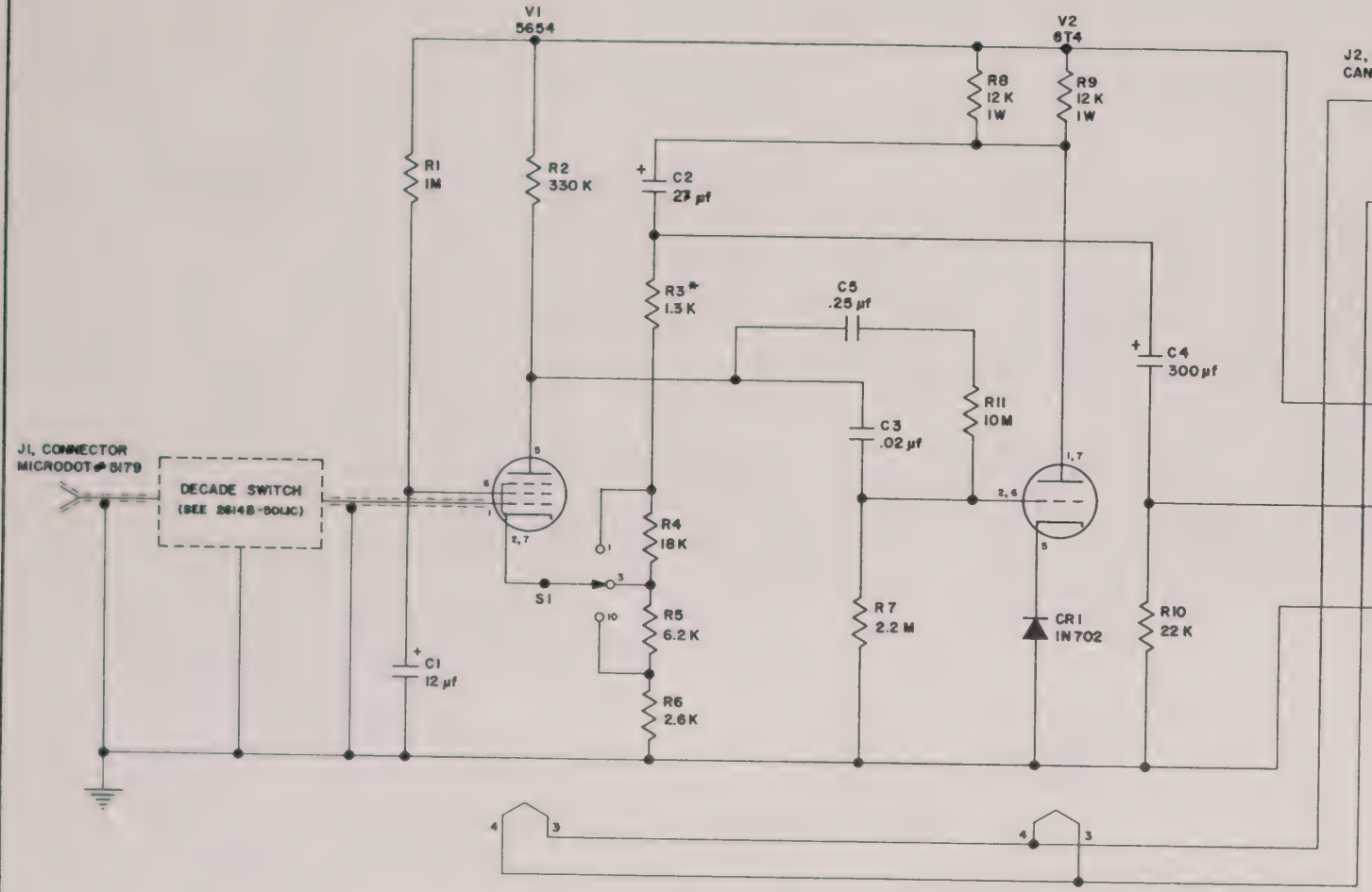
CHG	CHANGE DESCRIPTION	BY DATE	CHK	APPR
1	RELEASED, REPLACES 2614-501C	GLM 7/14/60	WB	
2	REREELEASED; C2 WAS 25 μf	GLM 9/14/60	WB	



C-2614B-501C 3

CHG. NO.	DESCRIPTION	BY DATE	CHK APPR
3	2SS RESISTOR R3 WAS 1K; ADDED NOTE TO (-) FIL.; REMOVED NOTE FROM (+) FIL.;	GLM 7/14/60	WB

* NOMINAL VALUE. (OPTIMUM PERFORMANCE REQUIRES SELECTION OF PART.)

ENDEVCO CORPORATION Pasadena, California

SPECIFICATIONS UNLESS OTHERWISE NOTED

LIMITS OF DIMS: ANGULAR ± —; FRACTIONAL ± —; DECIMAL ± —; SCALE —

1. BREAK ALL SHARP CORNERS .005 MAX.
2. SURFACE ROUGHNESS 63 MICROINCH RMS MAX.
3. DIAMETERS TO BE CONCENTRIC WITHIN .010 T.I.R.
4. FILLET RADIUS .010 MAX.

DO NOT SCALE DRAWING

MATERIAL: —

FINISH: —

DRAWN BY G.M.L. 5-9-'60

CHKD BY WB 6-9-60

PROJ. ENG. [illegible]

PART NAME: SCHEMATIC, AMPLIFIER

NEXT ASSY

C-2614B-501C CHG 3

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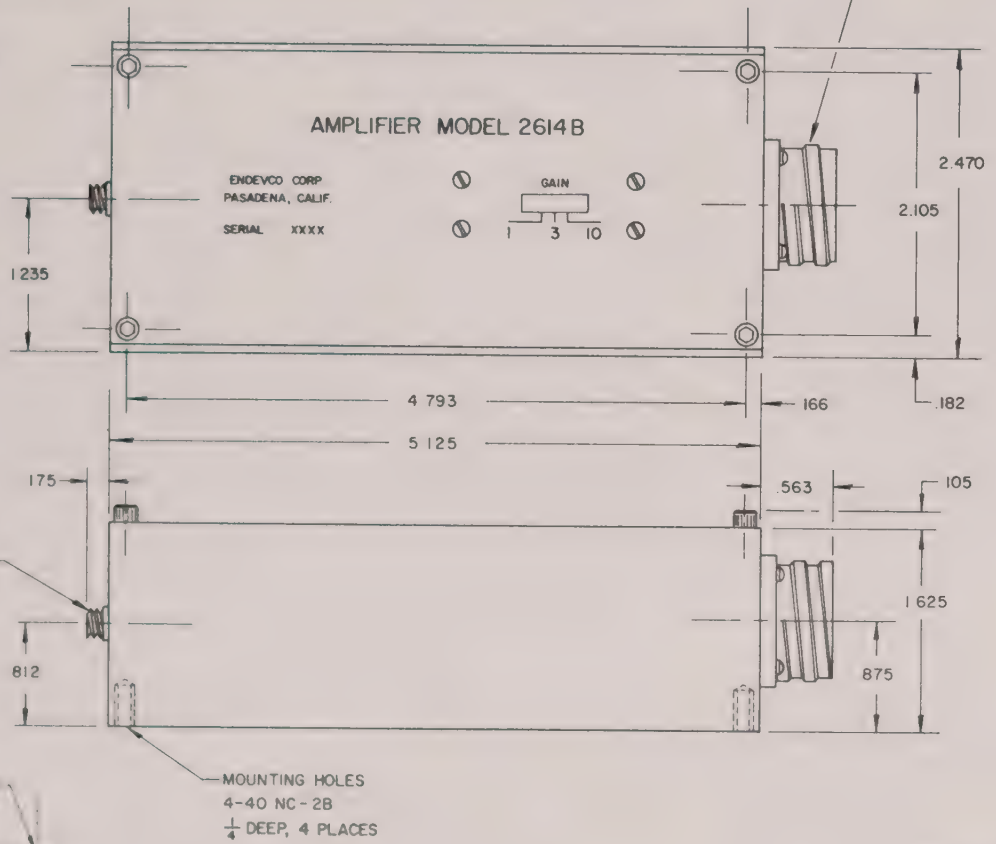
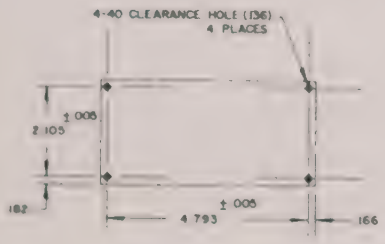
PART NO	DESCRIPTION	QUAN
C-2614B-1	AMPLIFIER, MAIN ASSEMBLY	1
	INSTRUCTION MANUAL	1
EP9	WK-6-21C-1/4 CONN.	1*

CHG	CHANGE DESCRIPTION	BY DATE	CHK	APPR
1	RELEASED	[illegible]	[illegible]	[illegible]
2	DELETED A2920-14. ADDED EP9 & * NOTE. E.O. # 863.	[illegible]	[illegible]	[illegible]

C-2614B-C | 2

* NOT SHIPPED WHEN AMPLIFIER IS SHIPPED WITH POWER SUPPLY.





MOUNTING HOLE PATTERN

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SPECIFICATIONS UNLESS OTHERWISE NOTED

LIMITS OF DIMS: ANGULAR ±—; FRACTIONAL ±—; DECIMAL ±.010

1. BREAK ALL SHARP CORNERS .005 MAX.
2. SURFACE ROUGHNESS 63 MICROINCH RMS MAX.
3. DIAMETERS TO BE CONCENTRIC WITHIN .010 T.I.R.
4. FILLET RADIUS .010 MAX.

SCALE —— DO NOT SCALE DRAWING

MATERIAL: ALUMINUM

FINISH: GRAY ANODIZE

DRAWN BY GMC 6/60

CHKD BY [illegible] 6-9-60

PROJ ENG [illegible]

PART NAME: AMPLIFIER

C-2614B-C | GRP 2

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ENDEVCO SALES OFFICES

If there are any questions concerning this unit, please be sure to contact the nearest Endevco Field Office or the Factory directly.

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TWX 213-449-3551

WARRANTY

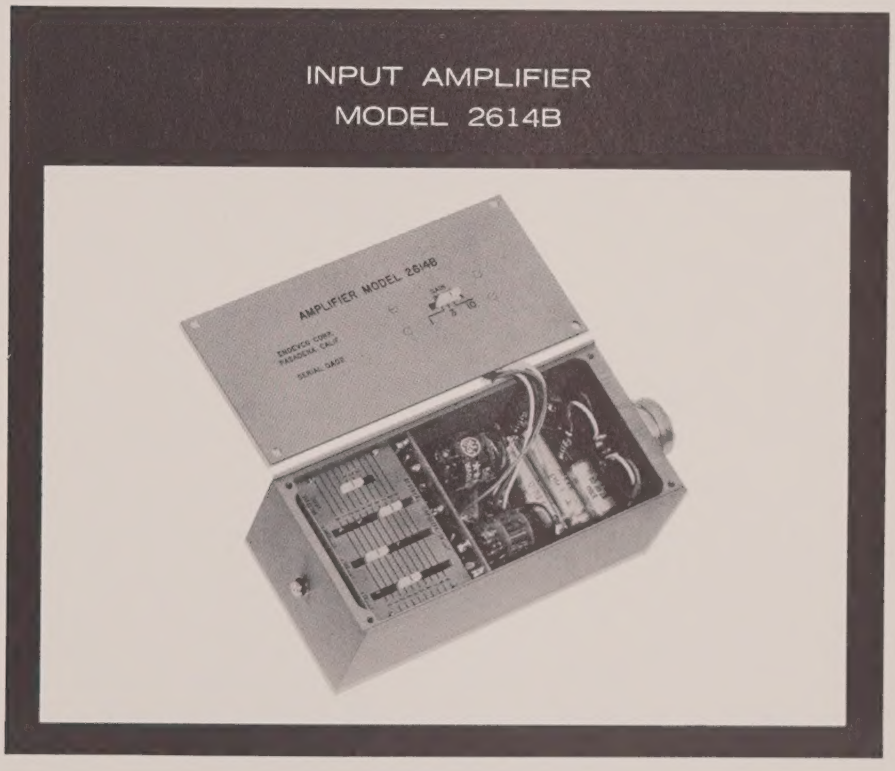
Endevco Corporation warrants each new instrument to be free from defective material and workmanship for one year from date of sale to the original purchaser. This warranty does not extend to vacuum tubes, transistors and choppers in the units, nor to units which have been misused or used in violation of Endevco recommendations, or to units which have been altered or repaired outside Endevco's factory. Defects covered by this warranty will be remedied at no charge provided the instrument is delivered to the factory with all transportation charges prepaid. If upon examination it is found that the defect is not within the scope of this warranty, a statement of repair charges and a request for authorization to proceed will be submitted.

dynamic instrumentation

The Endevco Model 2614B Input Amplifier is a markedly improved version of the Model 2614. It is designed to provide a very high input resistance of 1000 megohms and gains of 1, 3, or 10 into an output load of 2500 ohms or more. The high input resistance of 1000 megohms or 22 megohms (with or without DC isolation) is ideal for extending the low frequency response of Endevco piezoelectric gages well below 2 cps.

A 3 decade switch is provided on the input to allow the selection of shunt capacity across the input in 10 pf steps from 10 pf to 9990 pf. This feature trims the sensitivity of piezoelectric gages by shunting the output and permits the adjustment of many pick-ups to a "Standard" sensitivity value without affecting the high frequency response.

The small size of this amplifier permits its use in proximity to the pickup, thus reducing the effects of long lines and noise pickup.



OUTSTANDING FEATURES

STANDARDIZE PICKUPS to any desired sensitivity with 3 decade shunt capacity load.

THREE INPUT CONDITIONS 1000 megohms with no DC isolation.

1000 megohms with DC isolation for universal use including resistive sources.

22 megohms with DC isolation for short recovery time from overload.

GAIN OF 1, 3, AND 10 with stability of ±2% over specified conditions.

OUTPUT DRIVES GALVANOMETERS or any load above 2500 ohms. Use 2609. 1 Transformer for loads as low as 28 ohms.

TWX: 7764 CABLE: ENDEVCO

PRINTED IN U.S.A. REVISED SEPT. 1962

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ENDEVCO CORPORATION

801 SOUTH ARROYO PARKWAY • PASADENA, CALIFORNIA • SYCAMORE 5-0271

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MODEL 2614B SPECIFICATIONS

ELECTRICAL

INPUT CHARACTERISTICS	
Nominal Input Resistance	
Position #1:	1000 megohms (no DC isolation).
Position #2:	1000 megohms (with DC isolation, 0.02 μf blocking capacitor).
Position #3:	22 megohms (with DC isolation).
Transducer Standardizer:	All input positions include a variable capacitance load to standardize the output. Adjustable in 10 pf steps from 10 pf to 9990 pf. Accuracy ±10 pf or ±2%, whichever is larger. Residual capacity approximately 30 pf.
Overload Recovery Time:	60 seconds maximum for an AC voltage ten times full scale input.
OUTPUT CHARACTERISTICS	
Output Impedance	
Amplifier only:	75 ohms, resistive, max. in series with 300 μf.
With 2609.1 Transformer*:	10.0 ohms, max.
Maximum Output Voltage:	5 volts rms with load of 2500 ohms. 10 volts with load exceeding 25,000 ohms.
With 2609.1 Transformer*:	0.5 volts rms for loads exceeding 28 ohms and frequencies exceeding 6 cps. For measurements at 2 cps the output voltage should not exceed 0.1 volts rms.
Maximum Linear Current:	2.0 ma rms.
With 2609.1 Transformer*:	Approximately 50 ma peak-to-peak.
Residual Noise:	Less than 125 microvolts peak-to-peak at gain of
(referred to input)	10 and input shunted with 200 pf or greater.
TRANSFER CHARACTERISTICS	
Gain (no load):	1, 3, and 10 (external switch).
With 2609.1 Transformer*:	0.12, 0.35 and 1.15, nominal.
Gain Accuracy:	±1% at no load.
Gain Stability:	±2% under all specified conditions.
Frequency Response:	±3%, 2 cps to 20,000 cps with 10 K ohm load. ±5%, 2 cps to 20,000 cps with 2500 ohm load.
With 2609.1 Transformer*:	±5%, 3 cps to 10,000 cps with 28 to 500 ohm load.
Amplitude Linearity:	±1% maximum deviation from a straight line between zero and full scale.
Total Harmonic Distortion:	5% maximum.
Warm-up Time:	30 minutes for maximum accuracy.
POWER REQUIREMENT:	Filaments: 6.3 volts DC ±10% at 375 ma nominal. B+: 100 to 120 volts DC at 12 ma maximum.
Maximum Ripple Sensitivity:	1 μvolt per millivolt of filament ripple.
(referred to input)	35 μvolt per millivolt of plate supply ripple.

*A 330 ohm ±10% resistor must be connected in series with the primary of the 2609.1 transformer.

PHYSICAL

DIMENSIONS:	1⅝" x 2½" x 5⅛", excluding connectors.
WEIGHT:	16 ounces.
MOUNTING HOLE PATTERN:	Rectangular 4.793" x 2.105", 4-40 NC-2B, ¼" deep.
FINISH:	Gray Anodize.
CONNECTORS:	
Input:	Microdot Type 51-79 or equivalent.
Power and Output:	Cannon WK-6-32S.
ACCESSORIES:	Instruction Manual; a 2920-14 cable supplied when purchased with Endevco Power Supply, otherwise supplied with mating connector Cannon WK-6-21C-¼.

ENVIRONMENTAL

Designed for Laboratory use

TEMPERATURE:	+40°F to +125°F (+5°C to +52°C). Operating. −65°F to +185°F (−54°C to +85°C). Non-operating.

PRICE

AMPLIFIER MODEL 2614B	$250.00 each—F.O.B. Pasadena, California
TRANSFORMER MODEL 2609.1	$ 35.00 each—F.O.B. Pasadena, California

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